International Journal of Business
Management & Research (IJBMR)
ISSN(P): 2249-6920; ISSN(E): 2249-8036
Vol. 5, Issue 2, Apr 2015, 57-64

TEAM CREATIVITY IN ISD PROJECT TEAMS: KNOWLEDGE MANAGEMENT PERSPECTIVE

SHENG WU

Department of Information Management, Southern Taiwan University of Science and Technology, Taiwan

ABSTRACT

Knowledge management is an important topic to team-based studies. From the perspective of innovation management, frequent communication and cooperation promote the integration of the specialized knowledge held by individual team members, enhancing team creativity. The transactive memory system, knowledge sharing and knowledge application are crucial: team creativity is highly dependent on the extent to which knowledge is first store and shared among team members and then applied to solve problems. This study focuses on ISD teams and posits that when an ISD team proficiently spreads knowledge among its members—once the members are willing to share their knowledge—team members can learn from each other and continuously enrich their own knowledge base. This knowledge can then be creatively applied to overcome possible challenges. Drawing on data from a study of 81 team managers, the findings of this research show that all our hypotheses were statically significant.

KEYWORDS: Knowledge Management, Transactive Memory System, Knowledge Sharing, Knowledge Application, Team Creativity

INTRODUCTION

Scholars have widely acknowledged that teamwork is the most effective way for a company to operate internally. Teamwork allows for a high level of flexibility which can be a great asset when tackling various challenges. Team members with a common goal can enhance their problem-solving competencies by improving their skills and working relationships, and solve specific problems through mutual sharing and cooperation [21, 41]. As tasks are executed, the sharing of specialized knowledge which is distributed among team members can allow the team to achieve more creative results [32]. Leonard and Sensiper [25] pointed out that the information systems development (ISD) team is a key knowledge-based framework that enterprises need to consider. Because of the high flexibility of the ISD team, team members can be recruited from different departments. This flexibility allows adjustments for dealing with tasks of various sorts. When an enterprise is confronted with a problem on a new, unstructured model, it needs access to the wide variety of knowledge held within the enterprise. The ISD team framework and knowledge management systems and processes can be implemented together for effective knowledge integration, improving the performance of the ISD team and enhancing company competitiveness [18]. The ISD team framework, which includes gaining upper management support, dispatching manpower, and project schedule control, must allow the enterprise to respond quickly to external changes and solve a constant stream of new problems involving unstable risk factors. Therefore, the quality of the ISD team is measured by its level of creativity and its competence in solving problems. [1, 8, 22, 24]. The purpose of this study is to explore transactive memory system, knowledge sharing and knowledge application in an ISD team by understanding its impact on ISD teamwork creativity.

LITERATURE REVIEW AND HYPOTHESES

Transactive Memory System

A team's ability to effectively integrate knowledge provides a competitive advantage for the organization. A team is a group of two or more individuals who must interact cooperatively and adaptively to work on shared objectives [7]. An individual team member's knowledge is limited, and the team cannot depend entirely on some individual expert who stores specific knowledge needed by all teams. Therefore when one individual cannot solve the problem using his own knowledge, he must retrieve the required knowledge from other individuals. The term "transactive memory" has its origins in the concept of external storage acting as an extension of individual memory.

Past studies have shown that TMS is an important antecedent that affects team performance [11, 28]. Many scholars also point out that TMS can lead to effective knowledge creation among team members [4, 11, 31, 35, 44]. Mitchell and Nicholas [31] found that TMS is likely to have an impact on outcome creativity. Furthermore, it is important to explore how TMS affects different aspects of a team's knowledge management processes. When a team has the knowledge, skills and abilities required to execute projects, its members can use their diverse views to search for and develop creative solutions [36]. Cheng and Yang [10] also argued that team knowledge positively influences team creative self-efficacy. Therefore, we propose the first hypothesis.

H1: The TMS is positively associated with team creativity.

Knowledge Sharing

"Knowledge" plays a basic but essential role in boosting the competiveness of a company within its industry. Nowadays, knowledge sharing has become indispensable to a sound enterprise. "Knowledge sharing" is defined as allowing members within the organization or in external/internal teams to exchange or discuss knowledge within or across organizations via various channels such as face-to-face meetings, conferences, the Internet, published best practices and databases. The primary purpose of knowledge sharing is to increase the use of such knowledge and to derive knowledge synergies. Darr and Kurtzberg [12] suggested that knowledge sharing is a process of gaining experience from another individual; thus it is also called "knowledge transfer."

When team members share knowledge, creativity increases [23]. Honget al [20] found that knowledge sharing has a positive correlation with product development. Liu and Phillips [29] suggested that knowledge sharing is likely to lead to higher team innovativeness. Cheng [9] found that knowledge sharing positively influences student information system development project team creativity. Therefore, we propose the second hypothesis.

H2: Knowledge sharing is positively associated with team creativity.

Knowledge Application

Knowledge application is the use of existing knowledge to solve upcoming problems [3]. The application of knowledge is important since knowledge creation and sharing does not guarantee any improvement in overall performance unless that knowledge is applied [2, 3]. Therefore, if knowledge is simply shared or transferred within an organization without be applied to solve problems, the knowledge itself is useless. This is the so-called "knowledge-doing gap" [37]. The ISD team is the basic organizational unit for knowledge sharing and application activities. Team members come up with innovative ideas by exchanging, sharing and applying each individual's specialized knowledge.

Previous studies have concluded that there is an approximate correlation between knowledge management and creativity [46, 48]. Relevant knowledge management activities can inspire the team [26]. Creativity needs the support of knowledge, so both formal knowledge and informal knowledge chains are necessary [40]. From an innovation management perspective, intensive communication and cooperation within a team can integrate team members' specialized knowledge. Such integration enhances team and organizational creativity [6, 30]. Therefore, we propose the third hypothesis.

H3. Knowledge application is positively associated with team creativity.

Teamwork Creativity

The ISD team faces a constantly-changing environment, and success lies in the team's problem solving competencies. Problems arise when the ISD team senses a gap between expectations and reality [34, 42]. Therefore, the ability to reduce the gap between the ideal and the real is the so-called "problem solving competence" [8]. With problem solving competencies, an ISD team can quickly reduce the gap between the ideal and the real, which, in turn, boosts team performance [1]. Woodmanet al [45] suggested that creativity is another manifestation of problem-solving skills. Guilford [19] suggested that creativity and problem solving occur in the same mental state. Newellet al [33] argued that creativity is a particular problem-solving activity, characterized by novelty, peculiarity and difficulty.

According to the earlier literature and theories, this study depicted a research model as shown in Figure 1.

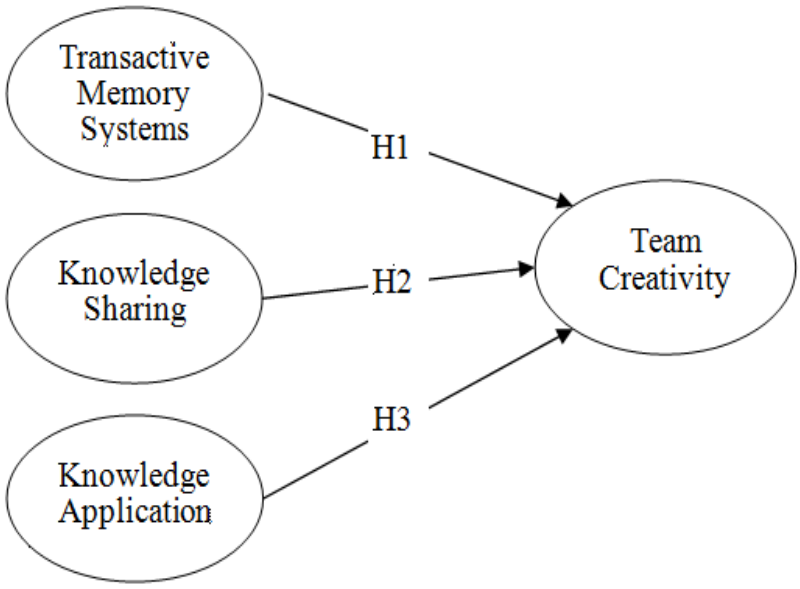


Figure 1: Research Model

RESEARCH METHODOLOGY

Subjects

The study targeted ISD team manager as its major subjects. Questionnaires were filled out by ISD team managers from information management departments at universities in Taiwan. These ISD teams belonged to a senior graduation project development effort. Every team manager was on team with 3-7 members. Respondents were primarily team manager from teams which had been working on year-long projects. Team managers were selected to complete the survey on the basis of their comprehensive view of the teamwork process and outcome evaluation [49]. A total of 93 team managers participated in the study. The exclusion of incomplete questionnaires resulted in a net total of 81 usable responses. Among those respondents (team managers), 47 were male and 34 were female.

Measurement Development

All Constructs were measured using a multiple-item scale drawn from pre-validated studies and reworded to relate specifically to teams. All items used five-point Likert scales ranging from "strongly disagree (=1)" to "strongly agree (=5)." Table 1 shows the operational definitions and sources of measurement of variables.

Table 1: Operationalization of Constructs

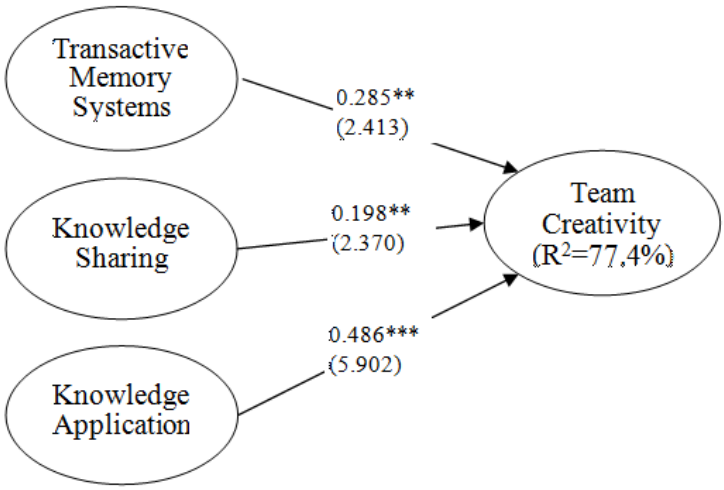
Construct	Operational Definition	# of Items	References
Transactive Memory Systems	The team's TMS rating, based on individual members' interactions with others on the team.	3	Yoo and Kanawattanachai [47]
Knowledge Sharing	The extent to which team members share different forms of knowledge.	6	Bock and Kim [5]
Knowledge Application	The rating of an individual's ability to apply team level knowledge to a problem.	3	Goldet al [16], Choiet al [11]
Team Creativity	The extent to which an ISD team's processes are novel in the context of the project's objectives.	4	Denisonet al [13],Tiwana and McLean [43]

Reliability and Validity

The partial least squares (PLS) model was employed to test our measurements and proposed hypotheses. This study employed SmartPLS 2.0 M3 [39]. Reliability can be ensured through composite reliability (CR>0.7) with all the CR values fall between 0.81-0.96, Cronbach's alpha (>0.7) with all the alpha values fall between 0.66-0.95, and factor loading (>0.7) with all the factor loading values fall between 0.71-0.96. The convergent validity should be tested when multiple indicators are used to measure one construct. This can be examined by testing the CR (>0.7) and average variance extracted (AVE>0.5) by constructs [15]. For the required discriminant validity, the correlation between construct pairs should be lower than 0.90 and the square root of AVE should be higher than the inter-construct correlation coefficients [15]. The all values indicate that all minimum requirements were met.

DATA ANALYSIS AND RESULTS

In this paper, we assessed the hypotheses via structural equation modeling because of its ability to validate multiple causal relationships simultaneously. This study used SmartPLS 2.0 M3 with bootstrapping as a resampling technique (500 random samples) to estimate the structural model and the significance of the paths [17]. Path coefficients (t value) and R^2 values were used jointly to evaluate the model. As shown in Figure 2, all hypotheses were supported. We found that transactive memory systems (β=0.285), knowledge sharing (β=0.198) and knowledge application (β=0.486) have an impact on team creativity. This result indicates that H1, H2 and H3 were also supported. As predicted, transactive memory systems, knowledge sharing and knowledge application have a positive influence on team creativity, which is consistent with the literature [10, 27, 29, 31]. In addition, the combination of transactive memory systems, knowledge sharing and knowledge application explains more than 70% of the variance of team creativity (R^2=77.4%). The explanatory power is considerably greater than the recommended level of 10% [14, 38]. Figure 2 indicate that all minimum requirements were met.



*p<0.05;**p<0.01;***p<0.001
(t-values in parentheses, based on two-tailed tests)

Figure 2: Results of PLS Analysis

CONCLUSIONS

This study focused on understanding how ISD teams' transactive memory systems, knowledge sharing, and knowledge application affect team creativity. Data from our survey of 81 ISD teams supported all of our proposed hypotheses. In figure 2 show, the knowledge application of team has relatively strong weighting, compared with transactive memory systems and knowledge sharing on team creativity. According to Griffithet al [18], shared knowledge must be circulated within the team and contribute to solutions; that is, potential team knowledge must be converted into usable knowledge for the team. Thus, the means by which shared knowledge can be applied becomes significant.

This study is not without limitations. First, the independent and dependent variables of this study are from the same respondent. In future, to avoid the risk of common method variance need to collect data from different sources or different time slots. Second, this study sample is student team. However, past research show that organizational culture and norm have significant impact teamwork process. Therefore, result of this study should not over generalization to team of corporate. Third, it does not measure how the transactive memory systems, knowledge sharing, knowledge application and team creativity of ISD teams change over time. All measures of these constructs are taken at a single point in time.

ACKNOWLEDGEMENTS

The author is thankful to the Ministry of Science and Technology under the Grants NSC 101-2410-H-218-003 and NSC 102-2410-H-218-017-MY2.

REFERENCES

1. Aladwani, A. M., An integrated performance model of information systems projects, *Journal of Management Information Systems*, Vol.19, No.1, 2002, pp. 185-210.
2. Alavi, M. and D. E. Leidner, Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues, *MIS Quarterly*, Vol.25, No.1, 2001, pp. 107-136.
3. Alavi, M. and A. Tiwana, Knowledge integration in virtual teams: The potential role of KMS, *Journal of the*

American Society for Information Science & Technology, Vol.53, No.12, 2002, pp. 1029-1037.

4. Argote, L., B. McEvily, and R. Reagans, Managing knowledge in organizations: An integrative framework and review of emerging themes, *Management Science*, Vol.49, No.4, 2003, pp. 571-582.
5. Bock, G. W. and Y. G. Kim, Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing, *Information Resources Management Journal*, Vol.15, No.2, 2002, pp. 14-21.
6. Boutellier, R., O. Gassmann, H. Macho, and M. Roux, Management of dispersed product development teams: The role of information technologies, *R&D Management*, Vol.28, No.1, 1998, pp. 13-25.
7. Cannon-Bowers, J. A., E. Salas, and S. A. Converse, *Shared mental models in expert team decision-making*, in *Individual and Group Decision Making*, N. J. Castellan Jr, Editor, Lawrence Erlbaum: Hillsdale. p. 221-246, 1993.
8. Cerveny, R. P., E. J. Garrity, and G. L. Sanders, A problem-solving perspective on systems development, *Journal of Management Information Systems*, 1990, pp. 103-122.
9. Cheng, H.-H., Student Team Creativity in Information System Development: Social Capital Perspective, *Journal of Software*, Vol.8, No.9, 2013, pp. 2134-2141.
10. Cheng, H.-H. and H.-L. Yang, The antecedents of collective creative efficacy for information system development teams, *Journal of Engineering and Technology Management*, Vol.33, 2014, pp. 1-17.
11. Choi, S. Y., H. Lee, and Y. Yoo, The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study, *MIS Quarterly*, Vol.34, No.4, 2010, pp. 855-870.
12. Darr, E. D. and T. R. Kurtzberg, An investigation of partner similarity dimensions on knowledge transfer, *Organizational behavior and human decision processes*, Vol.82, No.1, 2000, pp. 28-44.
13. Denison, D. R., S. L. Hart, and J. A. Kahn, From chimneys to cross-functional teams: Developing and validating a diagnostic model, *Academy of Management Journal*, Vol.39, No.4, 1996, pp. 1005-1023.
14. Falk, R. F. and N. B. Miller, *A primer for soft modeling*: University of Akron Press, 1992.
15. Fornell, C. and D. F. Larcker, Evaluating structural equation models with unobservable variables and measurement error, *Journal of marketing research*, Vol.18, No.1, 1981, pp. 39-50.
16. Gold, A. H., A. Malhotra, and A. H. Segars, Knowledge management: An organizational capabilities perspective, *Journal of Management Information Systems*, Vol.18, No.1, 2001, pp. 185-214.
17. Goodhue, D., W. Lewis, and R. Thompson, Research Note-Statistical Power in Analyzing Interaction Effects: Questioning the Advantage of PLS with Product Indicators, *Information systems research*, Vol.18, No.2, 2007, pp. 211-227.
18. Griffith, T. L., J. E. Sawyer, and M. A. Neale, Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals, and information technology, *MIS Quarterly*, Vol.27, No.2, 2003, pp. 265-287.
19. Guilford, J. P., Creative thinking and problem solving, *Education Digest*, Vol.29, No.8, 1964, pp. 29-31.

20. Hong, P., W. J. Doll, A. Y. Nahm, and X. Li, Knowledge sharing in integrated product development, *European Journal of Innovation Management*, Vol.7, No.2, 2004, pp. 102-112.
21. Katzenbach, J. R. and D. K. Smith, *The wisdom of teams: Creating the high-performance organization*: Harvard Business Press, 1993.
22. Khatri, V., I. Vessey, V. Ramesh, P. Clay, and S. J. Park, Understanding conceptual schemas: Exploring the role of application and IS domain knowledge, *Information systems research*, Vol.17, No.1, 2006, pp. 81-99.
23. Kurtzberg, T. R. and T. M. Amabile, From Guilford to creative synergy: Opening the black box of team-level creativity, *Creativity Research Journal*, Vol.13, No.3-4, 2001, pp. 285-294.
24. Lee, G. and W. Xia, The ability of information systems development project teams to respond to business and technology changes: a study of flexibility measures, *European Journal of Information Systems*, Vol.14, No.1, 2005, pp. 75-92.
25. Leonard, D. and S. Sensiper, The role of tacit knowledge in group innovation, *California management review*, Vol.40, No.3, 1998, pp. 112-132.
26. Liebowitz, J., Knowledge management and its link to artificial intelligence, *Expert Systems with Applications*, Vol.20, No.1, 2001, pp. 1-6.
27. Lin, F.-R. and S.-C. Lin, A conceptual model for virtual organizational learning, *Journal of Organizational Computing and Electronic Commerce*, Vol.11, No.3, 2001, pp. 155-178.
28. Lin, T. C., J. S. C. Hsu, K. T. Cheng, and S. Wu, Understanding the role of behavioural integration in ISD teams: An extension of transactive memory systems concept, *Information Systems Journal*, Vol.22, No.3, 2012, pp. 211-234.
29. Liu, Y. and J. S. Phillips, Examining the antecedents of knowledge sharing in facilitating team innovativeness from a multilevel perspective, *International Journal of Information Management*, Vol.31, No.1, 2011, pp. 44-52.
30. Madhavan, R. and R. Grover, From embedded knowledge to embodied knowledge: new product development as knowledge management, *The Journal of Marketing*, 1998, pp. 1-12.
31. Mitchell, R. and S. Nicholas, Knowledge creation in groups: The value of cognitive diversity, transactive memory and open-mindedness norms, *Electronic Journal of Knowledge Management*, Vol.4, No.1, 2006, pp. 67-74.
32. Mohrman, S. A., S. G. Cohen, and A. M. Morhman Jr, *Designing team-based organizations: New forms for knowledge work*, San Francisco: Jossey-Bass, 1995.
33. Newell, A., J. Shaw, and H. A. Simon, *The processes of creative thinking*: Rand Corporation, 1959.
34. Newell, A. and H. A. Simon, *Human problem solving*. Vol. 14: Prentice-Hall Englewood Cliffs, NJ, 1972.
35. Oshri, I., P. v. Fenema, and J. Kotlarsky, Knowledge transfer in globally distributed teams: The role of transactive memory, *Information Systems Journal*, Vol.18, No.6, 2008, pp. 593-616.
36. Paulus, P., Groups, Teams, and Creativity: The Creative Potential of Idea-generating Groups, *Applied Psychology*, Vol.49, No.2, 2000, pp. 237-262.

37. Pfeffer, J. and R. I. Sutton, *The knowing-doing gap: How smart companies turn knowledge into action*: Harvard Business School Press, 1999.

38. Phang, C. W., J. Sutanto, A. Kankanhalli, Y. Li, B. C. Y. Tan, and H. H. Teo, Senior citizens' acceptance of information systems: A study in the context of e-government services, *IEEE Transactions on Engineering Management*, Vol.53, No.4, 2006, pp. 555-569.

39. Ringle, C. M., S. Wende, and A. Will, SmartPLS 2.0 (M3), 2005: Hamburg.

40. Sternberg, R. J. and T. I. Lubart, *Defying the crowd: Cultivating creativity in a culture of conformity*: Free Press, 1995.

41. Sundstrom, E., K. P. De Meuse, and D. Futrell, Work teams: Applications and effectiveness, *American psychologist*, Vol.45, No.2, 1990, pp. 120-133.

42. Thomas, K. W., M. Dunnette, and L. Hough, *Handbook of industrial and organizational psychology*. Handbook of industrial and organizational psychology, 1976.

43. Tiwana, A. and E. R. McLean, Expertise integration and creativity in information systems development, *Journal of Management Information Systems*, Vol.22, No.1, 2005, pp. 13-43.

44. Weber, R. A. and C. F. Camerer, Cultural conflict and merger failure: An experimental approach, *Management Science*, Vol.49, No.4, 2003, pp. 400-415.

45. Woodman, R. W., J. E. Sawyer, and R. W. Griffin, Toward a theory of organizational creativity, *Academy of Management Review*, Vol.18, No.2, 1993, pp. 293-321.

46. Yli-Renko, H., E. Autio, and H. J. Sapienza, Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms, *Strategic Management Journal*, Vol.22, No.6-7, 2001, pp. 587-613.

47. Yoo, Y. and P. Kanawattanachai, Developments of transactive memory systems and collective mind in virtual teams, *International Journal of Organizational Analysis*, Vol.9, No.2, 2001, pp. 187-208.

48. Zarraga, C. and J. M. Garcia-Falcon, Factors favoring knowledge management in work teams, *Journal of Knowledge Management*, Vol.7, No.2, 2003, pp. 81-96.

49. Zimmer, J. C., R. M. Henry, and B. S. Butler, Determinants of the use of relational and nonrelational information sources, *Journal of Management Information Systems*, Vol.24, No.3, 2007, pp. 297-331.